Multi-Resolution Environments in Simulation Workshop

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Mission Rehearsal

Prepare Aircrews to Execute Sensitive National Command Authority Operations

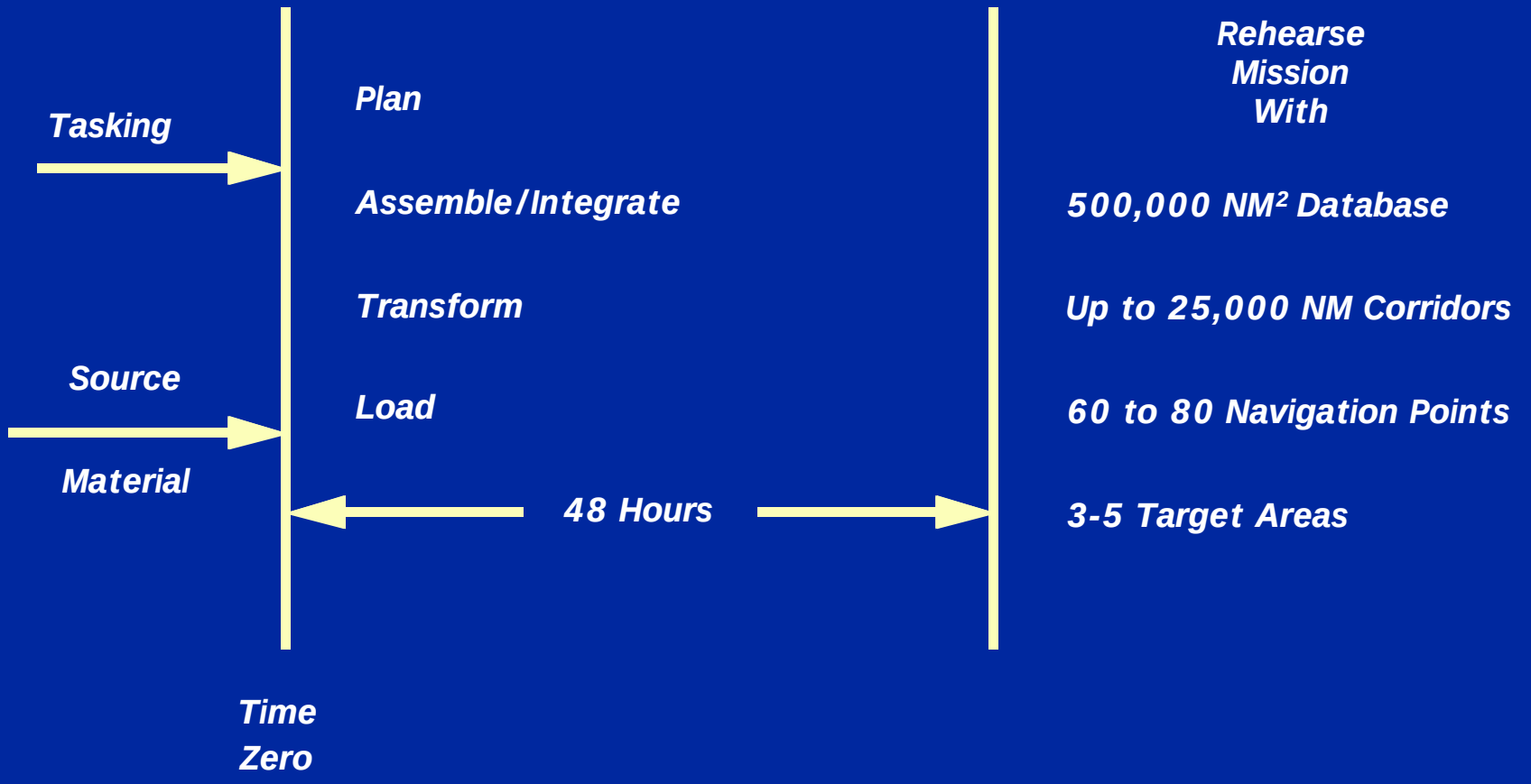
Practice and Hone Tactics for a Specific Mission Before Mission Execution

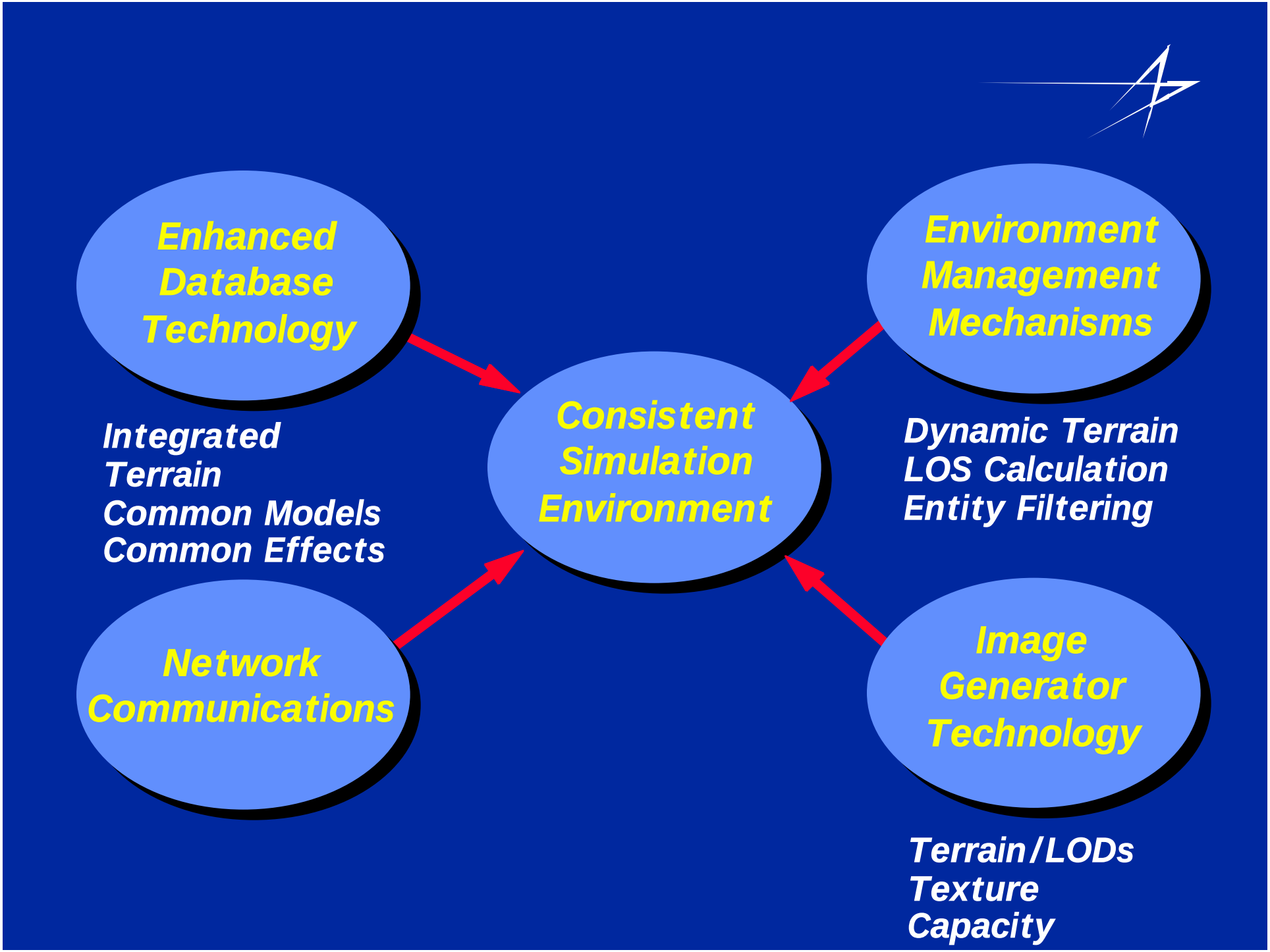
Provide Fully Qualified Personnel the Opportunity to Experience the Specific Mission Environment Including the Threat Environment and the Physical Characteristics of the Specific Mission Area.

Provide Feedback to Decision Makers on Risks Involved and the Probability of Mission Success

Database Generation System

Database Generation System Performance Requirement




Enhanced Database Technology
Integrated Terrain
Common Models
Common Effects
Environment Management Mechanisms
Dynamic Terrain
LOS Calculation
Entity Filtering
Consistent Simulation Environment
Network Communications
Image Generator Technology
Terrain/LODs
Texture
Capacity

Input Source Data

- Defense Mapping Agency Digital Products:
  - DFAD
  - DTED
  - DCW
  - ADRG
  - ITD
- SIF Digital Data
- Imagery:
  - Spot
  - Landsat
  - Reconnaissance Cameras
  - Classified National Sources
- Hardcopy Maps

Database Requirements

Mission Requirements

- *System Applications*
  - *Virtual, Constructive and Live Interoperability (e.g., STOW)*
  - *Training*
  - *Planning*
  - *Preview*
  - *Rehearsal*
  - *Execution*
  - *Assessment*
- *System Applications*
  - *Material Development*
  - *Combat Development*
  - *Training Development*
  - *Evaluation/Operational Training*

Interoperability Definition

The database must be capable of being used for a wide variety of applications which will execute on numerous platforms. For those cases where simultaneous use of the database by a number of entities is occurring, the interaction of each with others must be realistic and fair. No platform must gain a tactical advantage or disadvantage based solely on technical limitations of the terrain database.

Database Requirements

Common Environment

- *Common/Correlated Multi-Level of Detail Database*
  - *Feature vs. Terrain*
    - *> e.g., Rivers vs. Terrain Surface*
  - *Multi-Sensor Attributes*
    - *> e.g., Color vs. Surface Material*
  - *Levels of Detail (Several Examples)*
    - *> Vegetation Texture vs. Plants*
    - *> Common Terrain Inflection Points*
    - *> Representation of Major Cultural Entities*

Database Requirements (Cont.)

Common Environment

- Other Environment Components
  - Models
  - Weather Effects
  - Threats
- Algorithms
  - Intervisibility
  - Position Prediction

Image Generator Support

Mission Rehearsal and Preview

- *Lockheed Martin Compu-Scene PT 4000*
- *Evans & Sutherland ESIG 3000*
- *Evans & Sutherland ESIG 4000*
- *Lockheed Martin TOPSCENE*
- *Lockheed Martin GT200*
- *Any IG That Accepts Standard Data Formats*
  - *Standard Simulator Database Interchange Format (SIF)*
  - *Digital Feature Analysis Data (DFAD)*
  - *Digital Terrain Analysis Data (DTED)*
  - *ADDWAMS Format*
  - *S1000 Format*

Support and Readiness Issues

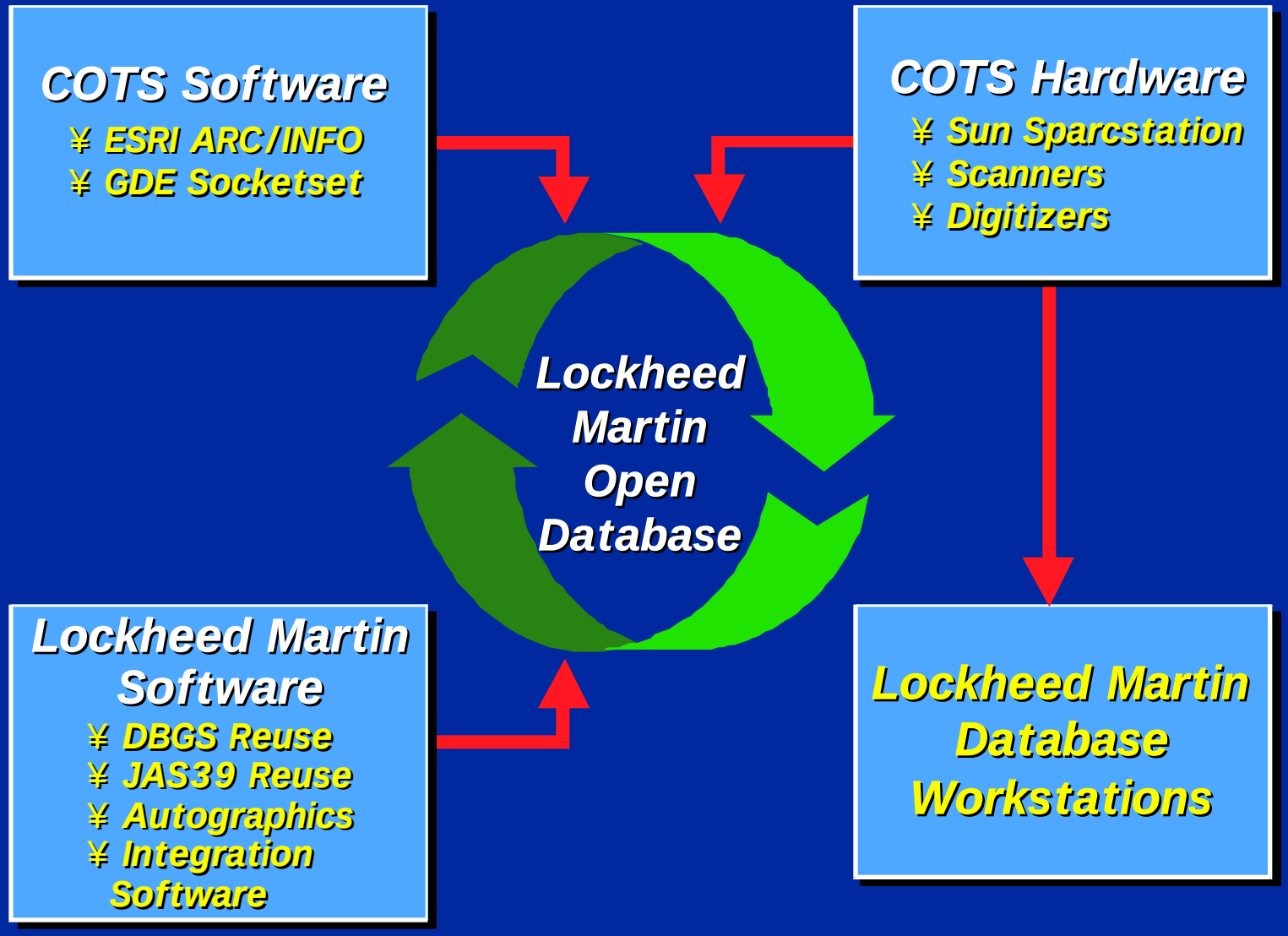
- Interoperable Databases will Reduce Simulation and Training Acquisition Costs
  - Enables Reuse of Previously Generated High Resolution Databases
    - > Adaptable to Both Commercial and Proprietary Image Generators
    - > Supports Program Technology Upgrades Without Redevelopment
- Improves Training Effectiveness
  - Provides Common Distributed Simulation Battlefield
  - Enables Database Consistency Across Simulation Platforms

Open Database Implementation

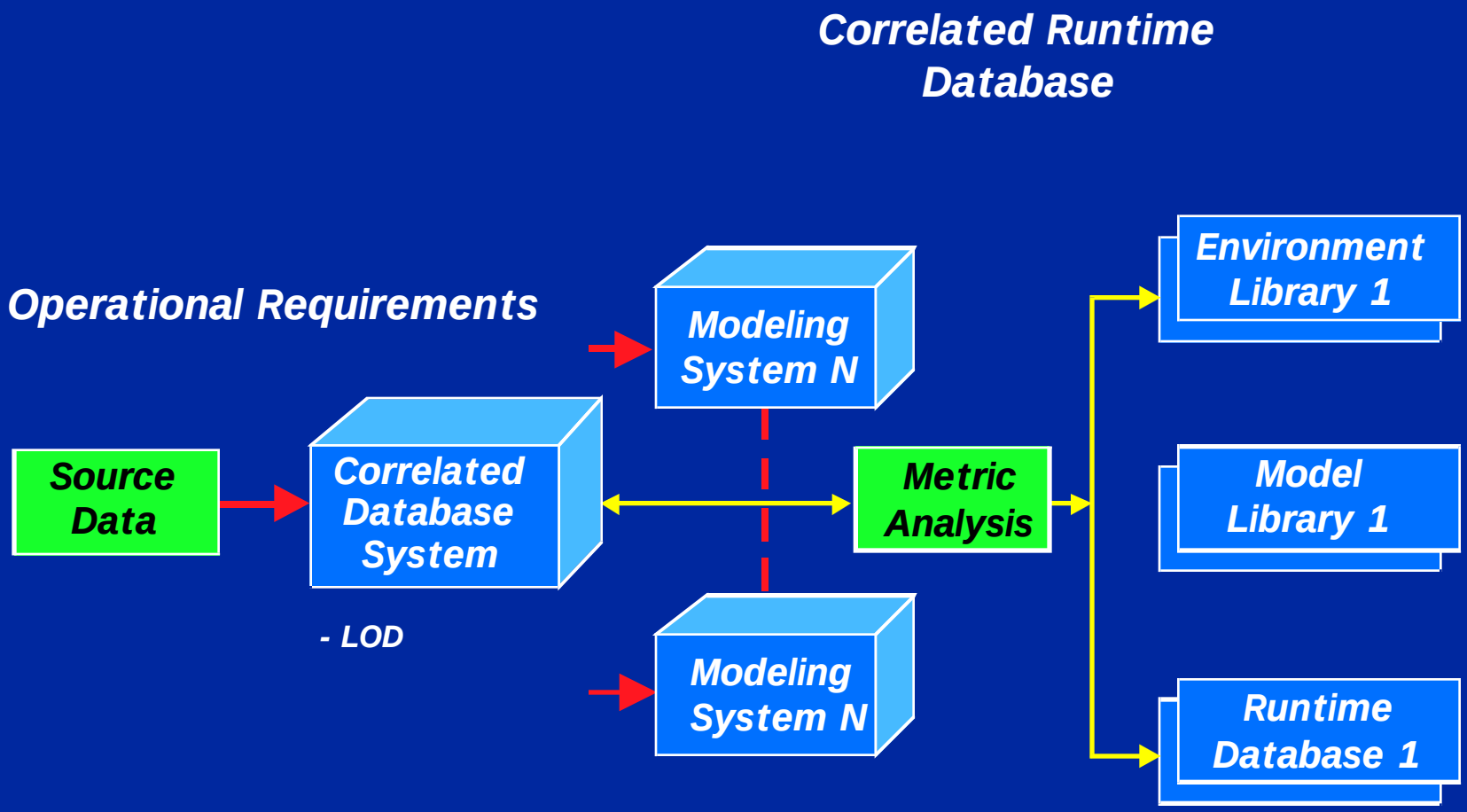
Mission Rehearsal and Preview

- *Retains Functionality Legacy Databases*
- *Maintains Unlimited Resolution Capability*
  - *Elevation*
  - *Texture*
  - *3D Models*
  - *2D Feature Data*
- *Expands for Unlimited Application Requirements*
  - *2D Feature Data Attribution*
- *Enables 2D Feature Attribution Modifications*
  - *Without Software Changes*
  - *Easy to Use Modification Tools*
  - *Attribution Definition*
  - *Template Creation*

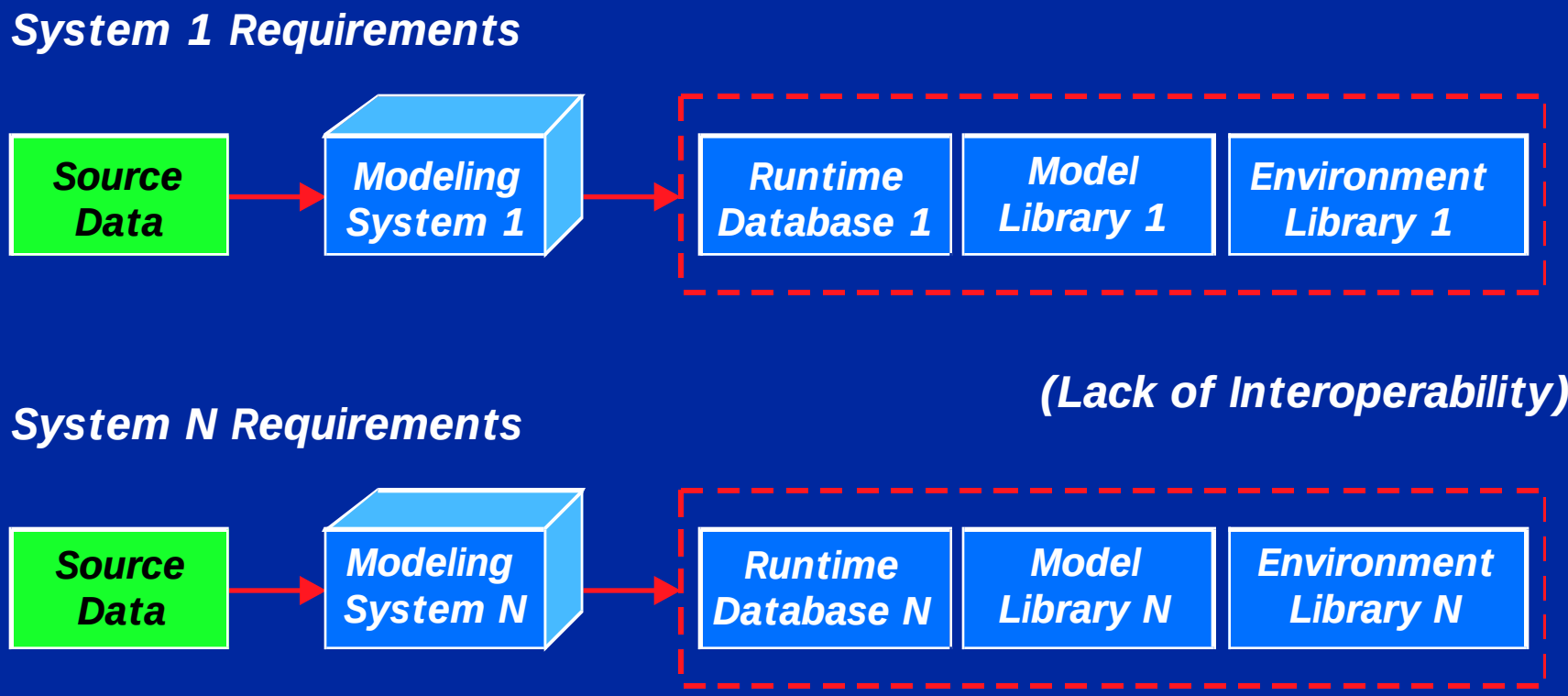
Database Development



New Method

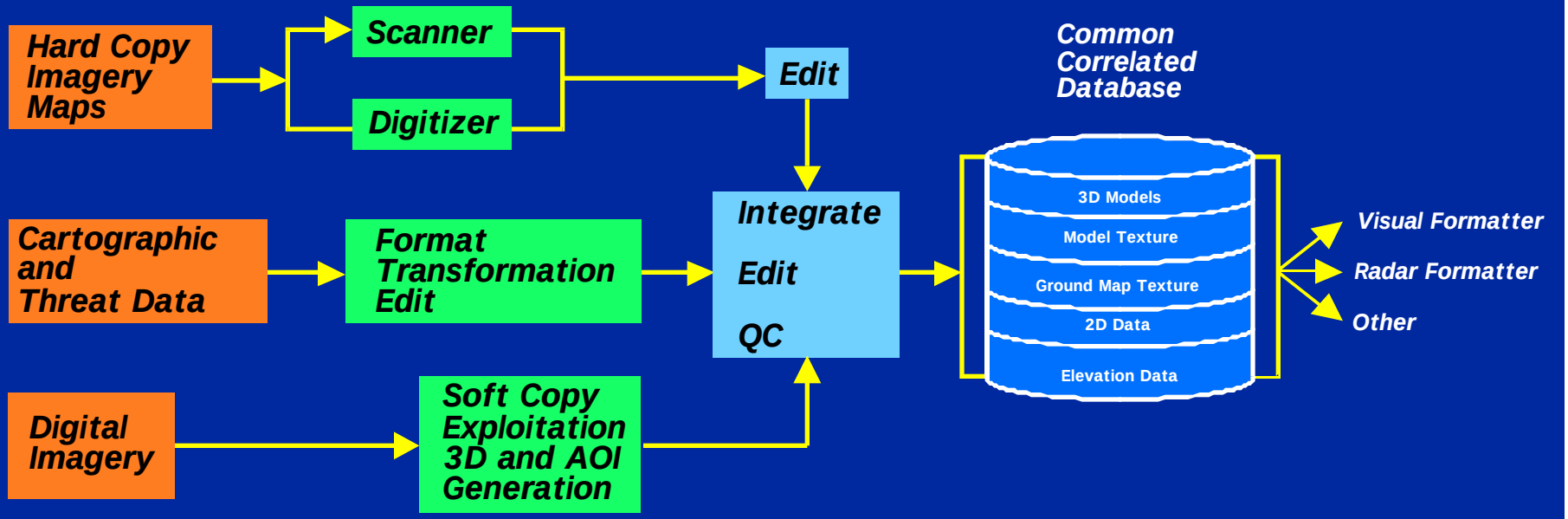

Correlated Runtime Database
Operational Requirements
Source Data
Correlated Database System
- LOD
Modeling System N
Modeling System N
Metric Analysis
Environment Library 1
Model Library 1
Runtime Database 1

Old Method

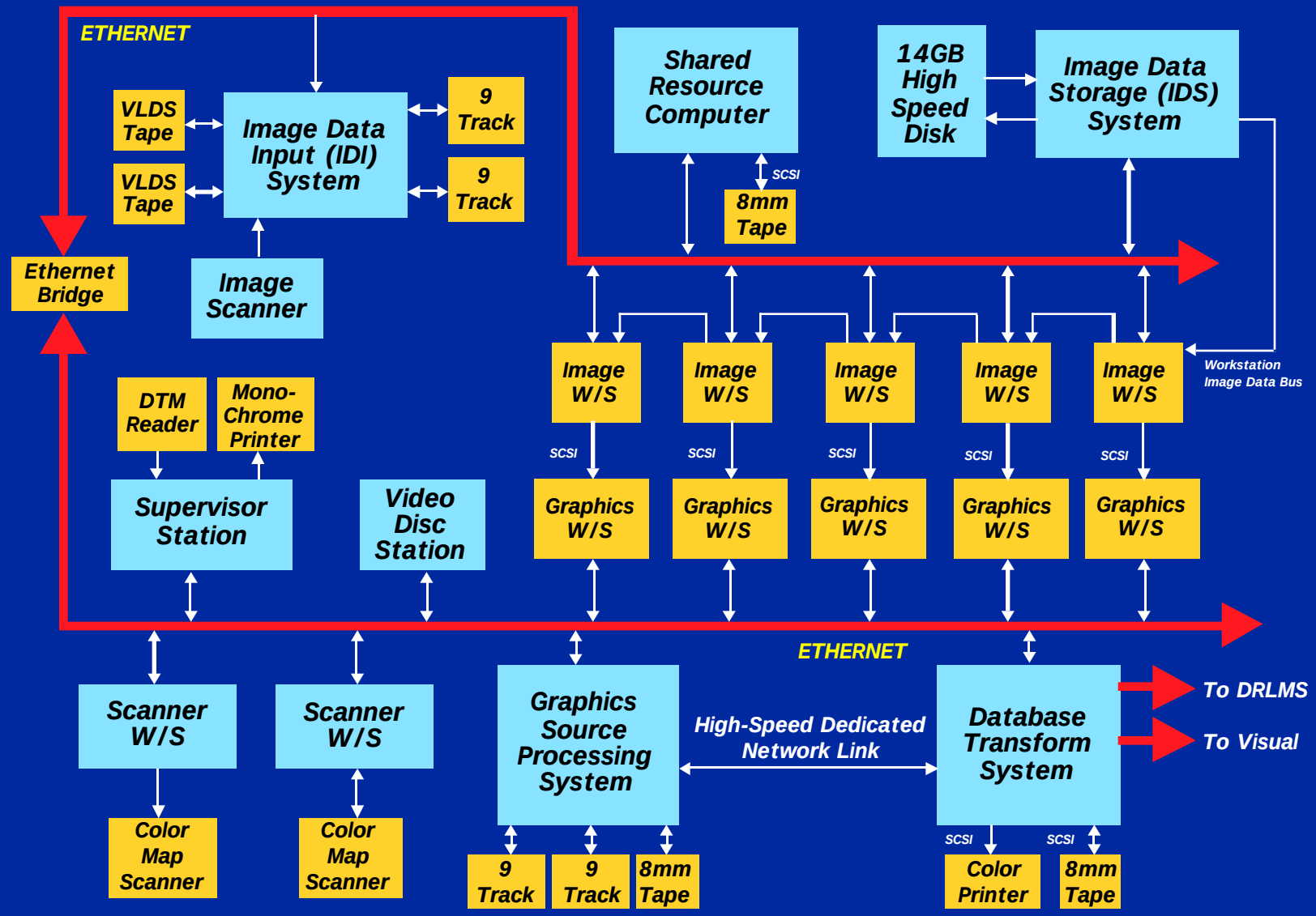

System 1 Requirements
Source Data
Modeling System 1
Runtime Database 1
Model Library 1
Environment Library 1
(Lack of Interoperability)
System N Requirements
Source Data
Modeling System N
Runtime Database N
Model Library N
Environment Library N

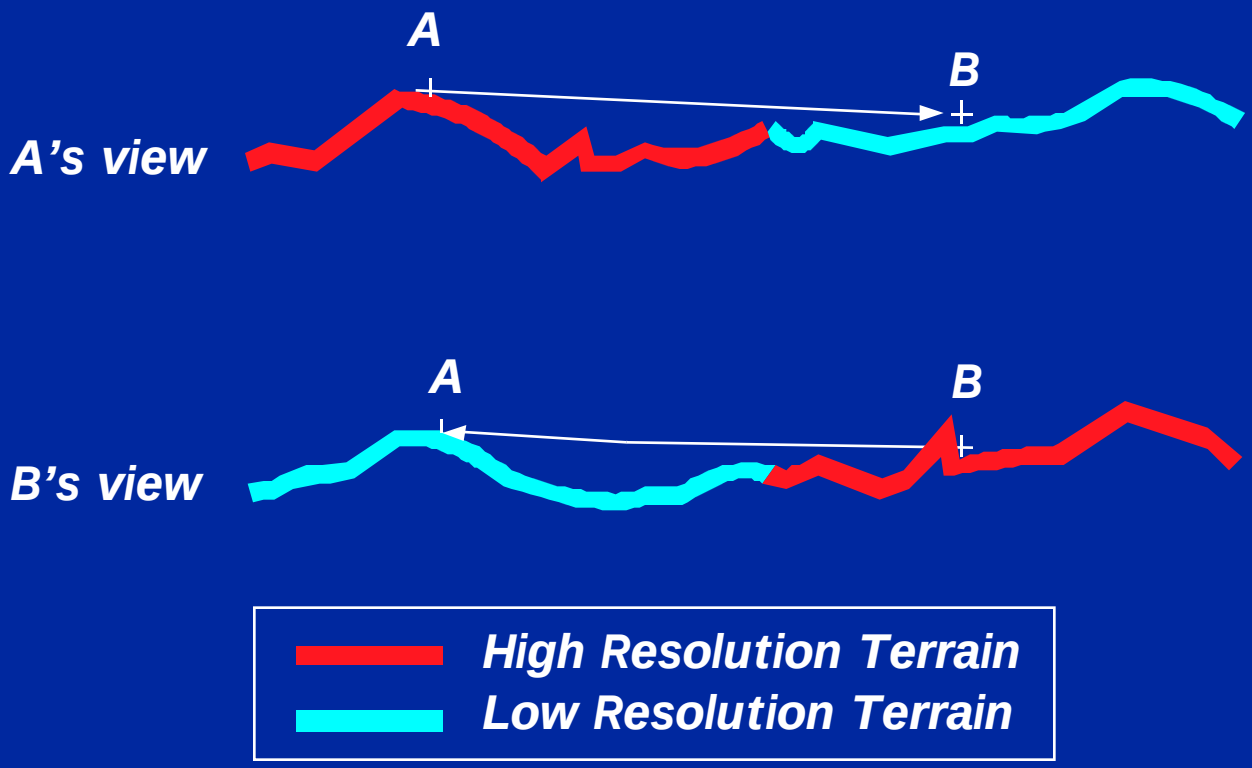
SOF Aircrew Training System

DBGS Data Flow



Database Generation System





Entities A and B each represent their near fields with high-resolution terrain and their far fields with low-resolution terrain. If rendering is done using the standard occulting methods of image generators, entity A will be able to see entity B, but entity B will believe he is hidden from entity A.